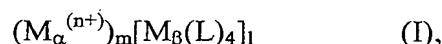


**We claim:**

1. A process for preparing lactones by catalytic carbonylation of oxiranes using a catalyst system comprising
  - a) at least one carbonylation catalyst A comprising uncharged or anionic transition metal complexes of metals of groups 5 to 11 of the Periodic Table of the Elements and
  - b) at least one chiral Lewis acid B,  
with the exception of  $[(\text{salph})\text{Al}(\text{THF})_2][\text{Co}(\text{CO})_4]$ , as catalyst.
2. A process as claimed in claim 1, wherein the lactones are mixtures of S- and R-lactones having an excess of one enantiomer.
3. A process as claimed in claim 1 or 2, wherein the ligands in the carbonylation catalyst A are uncharged ligands.
4. A process as claimed in any of claims 1 to 3, wherein the carbonylation catalyst A used comprises transition metal complexes of the formula (I)



where

30            $M_\beta$  is a transition metal of groups 8 to 10 of the Periodic Table of the Elements bearing the formal charge -1.

L is PR<sub>3</sub>, P(OR)<sub>3</sub>, NR<sub>3</sub>, SR<sub>2</sub>, OR<sub>2</sub>, CO, R-CN, R-NO<sub>2</sub>, (RO)(R'O)C=O, (R)(R')C=O, (R)C=O(OR').

$M_\alpha$  is a metal of group 1 or 2 of the Periodic Table of the Elements, Zn or Hg, bis(triarylphosphine)iminium,  $\text{trityl}^+$  or  $\text{T}(\text{R})_4^+$  where

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T is N, P or As,

R, R' are each, independently of one another, H, alkyl, aryl, alkaryl or aralkyl,

n, m are each 1 or 2 and

1 is  $n \times m$ .

- 10 5. A process as claimed in any of claims 1 to 4, wherein the transition metals present in the carbonylation catalyst A are Re, Co, Ru, Rh, Fe, Ni, Mn, Mo, W or mixtures thereof.
- 15 6. A process as claimed in claim 5, wherein Co is present as transition metal in the carbonylation catalyst A.
- 20 7. A process as claimed in any of claims 1 to 6, wherein the chiral Lewis acid B comprises compounds of metals of groups 2 to 13 of the Periodic Table of the Elements which are present in coordinatively unsaturated form under the reaction conditions.
- 25 8. A catalyst as defined in any of claims 1 and 3 to 7, with the exception of  $[(\text{salph})\text{Al}(\text{THF})_2][\text{Co}(\text{CO})_4]$ .
9. A process for preparing catalysts as claimed in claim 8 by mixing the components A and B.
10. The use of a catalyst as claimed in claim 8 in carbonylation reactions.